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- (57) Abstract:

Problem to be solved: To downsize an AC adaptor, by equipping an information processor with a judging means which judges the supply condition of the power from a plurality of power supply means, and a selection means which selects a plurality of operation modes, according to the judgment result from the judging means.

Solution: When a power switch is turned on, CPU 36 judges whether an AC adaptor is mounted or not, referring to the condition of a power judgment signal. In case that it judges that the AC adaptor is mounted, the CPU 36 shifts to an operation mode of not using a

flash lamp 42 and a red-eye lightening lamp 44. As a result, it follows that the use of the flash lamp 42 and the red eye lightening lamp 44 in photographing is inhibited. Then, the CPU 36 indicates the message of showing that the flash lamp 42 and the red-eye lightening lamp 44 can not be used, on an LCD 6. That is, in case that the power from the AC adaptor is supplied, it is possible to suppress the peak of power consumption, and the use of an AC adaptor of small maximum power supply capacity becomes possible.

[Claims]

[Claim 1] An information processor that has a plurality of operational modes, including a plurality of power supply means, a judging means which judges a supply state of electric power from the mentioned above a plurality of power supply means, a selecting means which chooses the mentioned above a plurality of operational modes according to a decision result of the mentioned above judging means.

[Claim 2] The information processor according to claim 1 characterized by the mentioned above selecting means choosing the mentioned above 2nd operational mode when the mentioned above judging means judges with an electric power supply being possible from the mentioned above 2nd power supply means, including the mentioned above a plurality of operational modes are the 1st operational mode, the mentioned above a plurality of power supply means

are the 1st power supply means that can supply sufficient electric power in the mentioned above 1st operational mode including the 2nd operational mode in which power consumption is smaller than the mentioned above 1st operational mode. In the mentioned above 2nd operational mode power supply is smaller than the mentioned above 1st power supply means, and the 2nd power supply means that can supply sufficient electric power.

[Claim 3] The information processor according to claim 2 when the mentioned above judging means judges with supply of electric power being possible from the mentioned above 1st power supply means characterized by that the mentioned above selecting means chooses the mentioned above 1st operational mode.

[Claim 4] The information processor according to claim 2 characterized by that the mentioned above 1st power supply means supplies electric power using commercial power.

[Detailed description of the invention]

[0001] [Field of the invention] Especially this invention relates to the information processor that uses a battery and an AC adapter as the power supply about an information processor.

[0002] [Description of the prior art] With improvement in the degree of location of a semiconductor device or progress of mounting technology, though it is small, the information processor which has many functions is becoming producible.

[0003] In recent years, since the performance of the battery improved, though it is small, the battery which has big capacity has become available.

[0004] Thus, the portability of a highly efficient information processor can be further improved by combining these information processors and batteries.

[0005] [Problems to be solved by the invention] However, although the performance improved, since the capacity of a battery is limited, there is a certain amount of limit in usable time too.

[0006] Next, although it is possible to use the AC adapter (external power) which obtains electric power from commercial power, a transformer needs to be used for an AC adapter in order to lower the pressure of voltage from the voltage (100V) of commercial power to the power supply voltage of an information processor.

[0007] For example, since big electric power is consumed in an electronic camera when using a flash lamp, a red-eye lightening lamp, etc., the power supplying of an AC adapter must also be large

enough. Since it is necessary to use a transformer with big size in order to supply big electric power, the size of an AC adapter becomes large. As a result, the technical problem that an AC adapter reduced the portability of an information processor remarkably occurred.

[0008] It makes it possible to make this invention in view of the above situations, to make it possible to miniaturize an AC adapter, and to raise the portability of an information processor further.

[0009] [Means for solving the problem] This invention in claim 1 is characterized by including a plurality of power supply means, a judging means which judges a supply state of electric power from a plurality of power supply means, a selecting means which chooses a plurality of operational modes according to a decision result of a judging means.

[0010] [Embodiment of the invention] Next, the example of this invention is described with reference to drawings.

[0011] Drawing 1 and drawing 2 are the perspective views showing the composition of one example of the electronic camera which applied this invention. In the electronic camera of this example, when capturing a photographic subject, the field turned to a photographic subject is made into the field X1, and the field turned to the user side is made into the field X2.

The light-emitting part (flash lamp) 4 which emits light when illuminating the finder 2 used for the check of the photographing area of a photographic subject, the taking lens 3 that incorporates the optical image of a photographic subject, and a photographic subject is formed in the upper bed part of the field X1.

[0012] On the other hand, the loudspeaker 5 which outputs the sound currently recorded on the mentioned above finder 2 and this electronic camera 1 is formed in the upper bed part (part which counters the part in which the finder 2 of the field X1, the taking lens 3, and the light-emitting part 4 are formed) of the field X2 which counters the field X1. LCD 6 and the operation key 7 (the menu screen key 7A, the execution key 7B, clear key 7C, the cancel key 7D, and the scroll key 7E) that are formed in the field X2 are formed in the perpendicular bottom rather than the finder 2, the taking lens 3, the light-emitting part 4 and the loudspeaker 5. On the surface of LCD 6, what is called the touch tablet 6A that outputs the position data corresponding to the directed position by the contact operation of the pen type indicating device mentioned below is formed.

[0013] This touch tablet 6A is constituted by transparent materials, such as glass and resin, and the user can observe the picture displayed on LCD 6 currently formed inside the touch tablet 6A by the touch tablet 6A.

[0014] The operation key 7 is a key operated when carrying out the repeat display of the record data to LCD 6, and is constituted by the key shown below. That is, the menu screen key 7A is a key operated when displaying a menu screen on LCD 6. The execution key 7B is a key operated when reproducing recorded information with the selected user.

[0015] Clear key 7C is a key operated when deleting the recorded information. The cancel key 7D is a key operated when interrupting reproduction of recorded information. The scroll key 7E is a key operated when making a sliding direction scroll a screen, when the list of recorded information is displayed on LCD 6.

[0016] The earphone jack 9 to which the microphone 8 which collects a sound, and the earphone which is not represented are connected is formed in the field Z which is the upper surface of the electronic camera 1.

[0017] The AC adapter jack 15 (a power supply means, the 1st power supply means) for connecting to a left lateral (field Y1) the release switch 10, the electric power switch 11, and AC adapter which are operated when capturing a photographic subject is formed.

[0018] On the other hand, the recording switch 12 operated when recording a sound, and the continuous shooting mode change over switch 13 operated when switching the continuous shooting mode at the time of photography are formed in the field Y2 (right lateral)

which counters the field Y1. Also, the recording switch 12 is formed in the almost same height as the release switch 10 of the field Y1 right and left whichever it has by a hand, it is constituted so that it may be comfortable.

[0019] By daring to change the height of the recording switch 12 and the release switch 10, it is good for the switch accidentally formed in the side of this opposite hand not to be pushed, and also make, when one switch is pushed and the side of an opposite hand is held with a finger, in order to negate the moment by this thrust.

[0020] The mentioned above continuous shooting mode change over switch 13 is used when a user pushes the release switch 10 and captures a photographic subject, and setting up whether that only one frame captures a photographic subject or predetermined a plurality of frame photography is carried out. For example, if the release switch 10 is pushed when the indicator of the continuous shooting mode change over switch 13 is switched to «S» and the printed position (that is, switched to S mode), only one frame perform photography.

[0021] In the case where the indicator of the continuous shooting mode change over switch 13 is switched to «L» and the printed position (that is, switched to L mode), if the release switch 10 is pushed, it performs photography of eight frames in 1

second during the period when the release switch 10 is pushed (that is, it becomes a low-speed continuous shooting mode).

[0022] In the case where the indicator of the continuous shooting mode change over switch 13 is switched to «H» and the printed position (that is, switched to the H mode), if the release switch 10 is pushed, it performs photography of 30 frames in 1 second during the period when the release switch 10 is pushed (that is, it becomes a high-speed continuous shooting mode).

[0023] Next, the composition inside the electronic camera 1 is explained. Drawing 3 is a perspective view showing the example of composition inside the electronic camera shown on drawing 1 and drawing 2. CCD 20 is provided in the latter part (field X2 side) of the taking lens 3, and carries out photoelectric conversion of the optical image of the photographic subject which carries out image formation via the taking lens 3 to an electrical signal.

[0024] The four batteries (AA dry cell (a power supply means, the 2nd power supply means)) 21 of cylindrical shape are perpendicularly arranged by the perpendicular bottom of LCD 6, and the electric power which this battery 21 generates is supplied to each part of a device.

The capacitor 22 that is accumulating the electric charge for making the light-emitting part 4 emit light is compared with the battery 21 and is arranged.

[0025] Various control circuits which control each part of this electronic camera 1 are formed in the circuit board 23. Between the circuit board 23, and LCD 6 and the battery 21, the memory card 24 in which insert and remove are possible is formed, and various kinds of information that it is inputted into this electronic camera 1 is recorded on the field to which the memory card 24 is set up preliminary.

[0026] Although insert and remove are possible for the memory card 24, a memory is provided on the circuit board 23 and it may be made to record a variety of information on the memory in this example. It may enable it to output the variety of information currently recorded on the memory (memory card 24) to an external personal computer by the interface that is not represented.

[0027] Next, the electric constitution inside the electronic camera 1 of this example is explained with reference to the block diagram of drawing 4. CCD 20 provided with a plurality of pixels carries out photoelectric conversion of the optical image which carried out image formation to each pixel to a picture signal (electrical signal). CCD driving part 39 is controlled by DSP 33 and drives CCD 20.

[0028] CCD 20 carries out the correlation double sampling of the picture signal which carried out photoelectric conversion to predetermined timing, and the image processing part 31 is controlled by an automatic gain control so that the signal value of the sampled picture signal becomes the optimal. The analog to digital conversion circuit (next an A/D conversion circuit) 32 digitize the picture signal sampled by the image processing part 31, and supplies the digital signal processor (next DSP) 33.

[0029] DSP 33 performs predetermined processing mentioned below to the digitized picture signal and supplies it to the compression expanding part 34. The compression expanding part 34 outputs compress the picture signal supplied from DSP 33 to CPU 36 (a judging means, selecting means). CPU 36 stores the picture signal (only next photographed image data) with which digitization and compression processing were performed in the predetermined field (taken image record section) of the memory card 24.

[0030] The information on the time which CPU 36 built in the clock circuit which is not represented and was captured as header information of image data, it records on the taken image record part of the memory card 24 (that is, the data of a photographing date accompanies the photographed image data recorded on the taken image record section of the memory card 24).

[0031] The microphone 8 inputs a sound (collecting a sound), changes it into a corresponding electrical signal, and supplies it to sound IC (Integrated Circuit) 38. Sound IC38 performs compression processing by ADPCM (Adaptive Differential Pulse Code Modulation), and supplies it to CPU 36 by a CPU control bus while it carries out the A/D conversion of the inputted audio signal.

[0032] CPU 36 records the sound data digitized and compressed on the predetermined field (sound recording field) of the memory card 24 by a CPU control bus. At this time, it is made record in the sound recording field of the memory card 24 as header information of sound data in the data of sound recording time.

[0033] When the position of the touch tablet 6A is pressed by the pen type indicating device (not represented) that a user operates, CPU 36, the X-Y coordinates of the position by which the touch tablet 6A was pressed are read, and it accumulated the coordinate data (line drawing information mentioned later) in the buffer memory 35. CPU 36 records the line drawing information accumulated in the buffer memory 35 on the line-drawing-information record section of the memory card 24 with the header information of line drawing information input time.

[0034] LCD 6 is connected to CPU 36 by the frame memory 40, and the display of the picture is enabled. However, the photographed image data in which compression processing was performed is inputted into the compression expanding part 34, and after being elongated there, it is once supplied the frame memory 40.

[0035] After a digital to analog (next D/A conversion) is performed by IC38 and changed into an analog signal, the sound data outputted from the memory card 24 is supplied to the loudspeaker 5, and is outputted as a sound.

[0036] The flash lamp actuator 41 is controlled by CPU 36, and drives the flash lamp 42 built in the light-emitting part 4. In a similar manner, the red-eye lightening lamp actuator 43 is controlled by CPU 36, and drives the red-eye lightening lamp 44 built in the light-emitting part 4. Just before the flash lamp 42 is turned on, the pupil of the person who is made as becomes a photographic subject by this is closed, this red-eye lightening lamp 44 can reduce what is called red eyes to which the eyes of the person in the captured picture become red.

[0037] The power supply part of this example is mentioned below.

[0038] Next, various operations of the electronic camera 1 of this example are explained.

[0039] First, the radial transfer (however, radial transfer of only sound information) of the sound information of this device is explained.

[0040] If the recording switch 12 formed in the field Y2 is pushed after a power supply is supplied to the electronic camera 1 by operating the electric power switch 11, audio sound recording processing (input process of sound information) will be started. Sound information is inputted by the microphone 8 and after an A/D conversion and compression processing are performed by sound IC38, it is supplied to CPU 36.

[0041] The sound data supplied to CPU 36 is supplied to the memory card 24, and is recorded on a sound recording field. At this time, the data of sound recording time is recorded on the sound recording field of the memory card 24 as header information of the compressed sound data. Such operation is continuously performed during the period which is pressing the recording switch 12.

[0042] Although the sound which can be set in this case was compressed with the ADPCM system, it may be made for other compression technology to be used for it.

[0043] Next, the operation at the time of photography of the photographic subject by this device is explained.

[0044] The continuous shooting mode change over switch 13 formed 1st in the field Y2 explains the case where it is switched to S mode (mode in which only one frame takes a photograph). When first a user operates the electric power switch 11 formed in the field Y1, a power supply is supplied to the electronic camera 1. A photographic subject is checked with the finder 2, and if the release switch 10 formed in the field Y1 is pushed, the photographing processing of a photographic subject will be started.

[0045] It is condensed with the taking lens 3 and the optical image of the photographic subject observed with the finder 2 carries out image formation to CCD 20 provided with a plurality of pixels. Photoelectric conversion of the optical image of the photographic subject which carried out image formation to CCD 20 is carried out to a picture signal by each pixel, and it is sampled by the image processing part 31. The picture signal sampled by the image processing part 31 is supplied to the A/D conversion circuit 32, is digitized there, and is outputted to DSP 33.

[0046] DSP 33 performs gamma processing which is nonlinear processing while performing processing which generates a color-difference signal from a RGB (Red Green Blue) signal. The compression expanding part 34 compresses the image data supplied from DSP 33 according to the JPEG (Joint Photographic Experts Group) method which combined discrete cosine

transformation, quantization, and Huffman encoding, and outputs it to CPU 36. CPU 36 makes the photographed image data by which digitization and compression processing were carried out record on the taken image record section of the memory card 24 by a CPU control bus. At this time, the data of a photographing date is recorded on the taken image record section of the memory card 24 as header information of photographed image data.

[0047] When the continuous shooting mode change over switch 13 is switched to S mode, even if only photography of one frame is performed, the release switch 10 continues and it continues being pushed, photography after it is not performed but the picture captured on LCD 6 is displayed.

[0048] The case where the continuous shooting mode change over switch 13 is switched to the 2nd by L mode (mode in which continuous shooting of eight frames is performed in 1 second) is explained. By operating the electric power switch 11, a power supply is supplied to the electronic camera 1, and if the release switch 10 formed in the field Y1 is pushed, the photographing processing of a photographic subject will be started.

[0049] It is condensed with the taking lens 3 and the optical image of the photographic subject observed with the finder 2 carries out image formation to CCD 20 provided with a plurality of pixels. Photoelectric

conversion of the optical image of the photographic subject which carried out image formation to CCD 20 is carried out to a picture signal, and it is sampled by the image processing part 31 at 8 times of a rate in 1 second. The image processing part 31 samples the pixel of 1/4 among all the pixels of CCD 20 at this time.

[0050] That is, the image processing part 31 divides into a 2x2 pixels (four pixels) field the pixel of CCD 20 arranged by matrix form, as shown on drawing 5, it samples 1-pixel picture signal arranged at the position of each field and thins out the remaining 3 pixels.

[0051] For example, at the time of the 1st sampling (1 frame eye), the pixel a at the upper left of each basic unit is sampled, and the other pixels b, c, d are thinned out. At the time of the 2nd sampling (2 frame eye), the pixel b at the upper right of each basic unit is sampled, and the other pixels a, c, d are thinned out. Next, at the time of the 3rd time and the 4th sampling, the lower left pixel c and the lower right pixel d are sampled, respectively, and other pixels are thinned out. That is, each pixel is sampled only once by 4 times.

[0052] The picture signal (picture signal of 1/4 of the pixels in all the pixels of CCD 20) sampled by the image processing part 31 is supplied to the A/D conversion circuit 32, is digitized there, and is outputted to DSP 33.

[0053] DSP 33 performs processing mentioned above to the digitized picture signal, and outputs it to the compression expanding part 34. The compression expanding part 34 performs compression processing based on a JPEG system to a picture signal, and supplies it to CPU 36. CPU 36 records the image data by which digitization and compression processing were carried out on the taken image record section of the memory card 24 by a CPU control bus. At this time, the data of a photographing date is recorded on the taken image record section of the memory card 24 as header information of photographed image data.

[0054] The case where the continuous shooting mode change over switch 13 is switched to the 3rd by the H mode (mode in which continuous shooting of 30 frames is performed in 1 second) is explained. By operating the electric power switch 11, it changes into the state of ON of the power supply of the electronic camera 1, and if the release switch 10 formed in the field Y1 is pushed, the photographing processing of a photographic subject will be started.

[0055] It is condensed with the taking lens 3 and the optical image of the photographic subject observed with the finder 2 carries out image formation to CCD 20. Photoelectric conversion of the optical image of the photographic subject which carried out image formation to CCD 20 provided with a plurality of pixels is carried out to a picture signal by each pixel,

and it is sampled by the image processing part 31 at 30 times of a rate in 1 second. The image processing part 31 samples the pixel of 1/9 among all the pixels of CCD 20 at this time.

[0056] Namely, as shown on drawing 6, the image processing part 31 the pixel of CCD 20 arranged by matrix form, it divides into 1 field which shall be 3x3 pixels and from 1 field, the 1-pixel picture electrical signal arranged at the position is sampled at 30 times of a rate in 1 second, and the remaining 8 pixels are thinned out.

[0057] For example, at the time of the 1st sampling (1 frame eye), the pixel a at the upper left of each field is sampled, and the other pixels b - i are thinned out. At the time of the 2nd sampling (2 frame eye), the pixel b arranged on the right side of the pixel a is sampled, and the other pixels a, c or i are thinned out. In the time of the 3rd sampling of the following the pixel c and the pixel d ... is sampled, respectively and other pixels are thinned out. That is, each pixel is sampled every nine frames.

[0058] The picture signal (picture signal of 1/9 of the pixels in all the pixels of CCD 20) sampled by the image processing part 31 is supplied to the A/D conversion circuit 32, is digitized there, and is outputted to DSP 33.

[0059] DSP 33 performs the mentioned above processing to the digitized picture signal, and supplies it to the compression expanding part 34. In the compression expanding part 34, according to a JPEG system, compression processing is performed to a picture signal, and it outputs to CPU 36.

[0060] CPU 36 adds the header information of a photographing date to the photographed image data by which digitization and compression processing were carried out, and records it on the taken image record section of the memory card 24.

[0061] Next, the operation in the case of inputting two-dimensional line drawing information (pen input information) from the touch tablet 6A is explained. If pressed with the nib of the pen type indicating device which the touch tablet 6A does not illustrate, the X-Y coordinates of the part which contacted will be supplied to CPU 36. Data is written in the part corresponding to each point of the mentioned above X-Y coordinates inside the frame memory 40, and these X-Y coordinates are displayed on LCD 6 while they are accumulated in the buffer memory 35.

[0062] As mentioned above, the touch tablet 6A currently formed on the surface of LCD 6, since it is constituted by the transparent member, the user can observe the point (point of the position pressed with the nib of the pen type indicating device) displayed on LCD 6, and he can sense as if he did the pen input

directly on LCD 6. If a pen type indicating member is moved on the touch tablet 6A, on LCD 6, the line accompanying movement of a pen type indicating device will be displayed. If a pen type indicating device is intermittently moved on the touch tablet 6A, on LCD 6, the dashed line accompanying movement of a pen type indicating device will be displayed.

The user can input the line drawing information of a desired character, a drawing, etc. from the touch tablet 6A (LCD 6) as mentioned above.

[0063] If line drawing information is inputted by the pen type indicating device when the taken image is displayed on LCD 6, with taken image information, this line drawing information will be compounded by the frame memory 40, and will be simultaneously displayed on LCD 6.

[0064] The user can choose the color of the line drawing displayed on LCD 6 from colors, such as black, white, red and blue, by operating the color selection switch which is not represented.

[0065] If the execution key 7B of the operation key 7 is pressed after the input of the line drawing information to the touch tablet 6A by a pen type indicating device, the line drawing information accumulated in the buffer memory 35 is supplied to the memory card 24 by a CPU control bus with the header information of input time, and is recorded on a line drawing information record part.

[0066] The line drawing information recorded on the memory card 24 is information to which compression processing was performed. Since compression efficiency is bad and cannot reduce the amount of information if the mentioned above JPEG system used for compression of a taken image performs compression processing, since the line drawing information inputted into the touch tablet 6A includes many information that a spatial frequency component is high, time required for compression and extension will become long. Since the compression by a JPEG system is lossy compression, it is not suitable for compression of line drawing information with little amount of information (since the gathers and the blot accompanying lack of information are conspicuous when it elongates and displays on LCD 6).

[0067] Then, it is trying to compress line drawing information in this example with the run length method used in fax etc. A run length method is the method of compressing line drawing information by scanning a line drawing screen horizontally and coding the length which the information on each color, such as black, white, red, and blue (point) continues, and the length which non-information (part without a pen input) continues.

[0068] When the line drawing information which could compress line drawing information effectively and was compressed by using this run length method

is elongated, it becomes possible to control lack of information. When there is comparatively little the amount of information, it can avoid compressing line drawing information.

[0069] If a pen input is performed when the taken image is displayed on LCD 6 as mentioned above, the line drawing information of photographed image data and a pen input will be compounded by the frame memory 40, and a taken image and the image composing of a line drawing will be displayed on LCD 6. On the other hand, in the memory card 24, photographed image data is recorded on a taken image record section, and line drawing information is recorded on a line drawing information record part. Thus, since two information is recorded on a respectively different field, from a taken image and the image composing of a line drawing, the user can delete one of pictures (for example, line drawing), and can also compress each picture information with an individual compression method further.

[0070] When data is recorded on the sound recording field, taken image record section or line-drawing-information record section of the memory card 24, as shown on drawing 7, a predetermined display is performed to LCD 6. In the display example shown on drawing 7, the date (record date) (in this case, August 25, 1995) at the time of recording information is displayed on the lower end part of a screen, and the

recording time of the information recorded on that record date is displayed on the leftmost side of a screen.

[0071] The thumbnail image is displayed on the right of recording time. This thumbnail image thins out the bit map data of each image data of the photographed image data recorded on the memory card 24, and is created (reducing). The information with this display is information including taken image information. That is, taken image information is included in the information «recorded at «10:16» and 10:21 (input)», and picture information is not contained in the information «recorded at «10:05», «10:28», «10:54», 13:10».

[0072] The memo sign «*» means that the predetermined memo is recorded as line drawing information.

[0073] A sound information bar is displayed on the right side of the viewing area of a thumbnail image, and the bar (line) of the length corresponding to the length of sound recording time is displayed on it (not displayed when sound information is not inputted).

[0074] A user reproduces the selected information by carrying out selected designation of the information which presses one part of the display lines of the information on the request of LCD 6 shown on drawing 7 with the nib of a pen type indicating device, and is reproduced, and pressing the execution

key 7B shown on drawing 2 with the nib of a pen type indicating device.

[0075] For example, if the line where «10:05» shown on drawing 7 is displayed is pressed by a pen type indicating device, CPU 36 will read the sound data corresponding to the selected sound recording time (10:05) from the memory card 24, and will supply it to sound IC38. Sound IC38 performs elongation processing to sound data (sound data compressed), and also performs D/A conversion, changes it into an analog signal, and is supplied to the loudspeaker 5. The loudspeaker 5 changes the supplied analog signal into a sound, and outputs it. When the earphone which is not represented to the earphone jack 9 is connected, from the loudspeaker 5, a sound is not reproduced but a sound is reproduced by the earphone which is not represented.

[0076] When reproducing the photographed image data recorded on the memory card 24, a user reproduces the selected information by choosing the information, then pressing the execution key 7B by pressing a desired thumbnail image with the nib of a pen type indicating device.

[0077] CPU 36 reads the photographed image data corresponding to the selected photographing date from the memory card 24, and supplies it to the compression expanding part 34.

It is elongated there and the photographed image data (photographed image data compressed) supplied to the compression expanding part 34 is again outputted to CPU 36. Once storing up CPU 36 in the frame memory 40 by using this photographed image data as bit map data, it is displayed on LCD 6.

[0078] The picture captured in S mode is displayed as a still picture on LCD 6. It cannot be overemphasized that this still picture reproduces the picture signal of all the pixels of CCD 20.

[0079] On LCD 6, the picture captured by L mode is continued and expressed as the rate of eight frames in 1 second. At this time, the pixel number displayed on each frame is $1/4$ of the total pixel number of CCD 20.

[0080] Since it is sensitive to degradation of the resolution of a still picture, if human vision thins out the pixel of a still picture, a user will detect this easily. However, in the L mode in which the picture of eight frames is reproduced in 1 second, although the pixel number of each frame drops to $1/4$ of the pixel number of CCD 20, since the picture of eight frames is reproduced in 1 second as mentioned above, the amount of information per unit time doubles compared with the case of a still picture.

[0081] That is, if the pixel number of one frame of the picture captured in S mode is set to 1, the pixel number of one frame of the picture captured by L

mode will be set to one fourth. When the picture (still picture) captured in S mode is displayed on LCD 6, the amount of information which goes into human eyes in 1 second is set to 1 ($=(\text{pixel number } 1) \times (\text{one frame})$).

On the other hand, when the picture captured by L mode is displayed on LCD 6, the amount of information which goes into human being's eyes in 1 second is set to 2 ($=(\text{pixel numbers } 1/4) \times (\text{eight frames})$) (that is, the information are twice many as a still picture goes into human eyes). Thus, even when the number of the pixels in 1 frame is set to $1/4$, a user does not care about degradation of image quality so much at the time of reproduction.

[0082] Since a different pixel for every frame is sampled in this example and it is trying to display the sampled pixel on LCD 6, even if the afterimage effect happens to human eyes and it thins out $3/4$ pixel per one frame, the user can observe the picture captured by the L mode displayed on LCD 6, without caring about degradation of image quality so much.

[0083] On LCD 6, the picture captured by the H mode is continued and expressed as the rate of 30 frames in 1 second. Although the pixel number displayed on each frame is $1/9$ of the total pixel number of CCD 20 at this time, the user can observe the picture captured by the H mode displayed on LCD 6 for the same

reason as the case of L mode, without caring about degradation of image quality so much.

[0084] Since image processing part 31 is trying to thin out the pixel of CCD 20 in this example when capturing a photographic subject by L mode and the H mode to such an extent that degradation of the image quality at the time of reproduction is not worrisome, the load of DSP 33 and the compression elongation processing part 34 can be reduced, and these can be operated with a low speed and low electric power. Low cost and low power consumption of a device become possible according to this.

[0085] Next, the power supply section of this example is explained.

[0086] Drawing 8 is a circuit diagram showing the details of the power supply section of this example. In this drawing, the battery contact buttons 60 and 61 are connected to the plus pole and minus pole of a battery which are shown on drawing 3, respectively. The AC adapter contact buttons 62 and 63 are built in the AC adapter jack 15 shown on drawing 1, and when the AC adapter which is not represented is connected, electric power is supplied to the electronic camera 1 via these terminals.

[0087] The switch 64 is a mechanical switch which will be in the OFF state in the case to which an AC adapter is connected, and prevents current from flowing into the battery 21 from an AC adapter.

The capacitor 65 removes the high frequency component which flows from an AC adapter. The diode 66 will be in a reverse biased state, when electric power is not supplied from an AC adapter, and the terminal by the side of an anode serves as ground voltage (0V). As a result, a power supply discrimination signal will be in the state of «0».

[0088] The diode 67 is a zener diode and is made to remove the noise etc. of the shape of an impulse included in commercial power. The capacitor 68 is an electrolytic condenser and is made to smooth the ripple contained in power supply voltage].

[0089] From the positive terminal of the capacitor 68, electric power is supplied to each part of a device. The negative terminal of the capacitor 68 is grounded and voltage of this terminal is a ground level (GND).

[0090] The anode terminal of the diode 66 is connected to the input port of CPU 36. CPU 36 judges the supply situation of a power supply by making voltage of this terminal into a power supply discrimination signal.

[0091] Drawing 9 is a drawing showing the relation between a power supply discrimination signal and the mounting state of an AC adapter. As shown on this drawing, when not being equipped with the AC adapter, a power supply discrimination signal will be in the state of «0» (when electric power is not supplied from an AC adapter).

When equipped with the AC adapter, a power supply discrimination signal will be in the state of «1» (when electric power is supplied from the AC adapter). According to the state of this signal, CPU 36 can detect the mounting state of an AC adapter.

[0092] Drawing 10 is a flow chart explaining an example of the processing which CPU 36 performs.

This processing is made to perform by the timer processing of CPU 36 for every constant period, after changing the electric power switch 11 into the state of ON.

[0093] If it changes the electric power switch 11 into the state of ON, in Step S10, CPU 36 will judge whether it is equipped with the AC adapter with reference to the state of a power supply discrimination signal. And when it judges with skipping processing of Step S11 and S12, and ending processing (end), and is equipped with the AC adapter, when it judges with (NO) which is not equipped with the AC adapter (YES), it progresses to Step S11.

[0094] In Step S11, CPU 36 shifts to the operational mode which does not use the flash lamp 42 and the red-eye lightening lamp 44. As a result, use of the flash lamp 42 at the time of photography and the red-eye lightening lamp 44 will be forbidden. And if it progresses to Step S12, CPU 36 will display on LCD 6 the message which shows that the flash lamp 41 and

the red-eye lightening lamp 44 cannot be used and will end processing (end).

[0095] When a user tries to take a photograph under the situation in which are the mode which cannot use the flash lamp 42 and the red-eye lightening lamp 44, and use of the flash lamp 42 is indispensable, for example, while generating a beep sound, the message (refer to drawing 11) which shows that a flash plate cannot be used during AC adapter use is displayed on LCD 6, and cautions are demanded from a user.

[0096] Since according to the above processing it becomes the operational mode which does not use the flash lamp 42 which needs big electric power and the red-eye lightening lamp 44 when electric power is supplied from the AC adapter, it becomes possible to control the peak of power consumption. Thus, since the small AC adapter of maximum dissipation serviceability can be used, an AC adapter can be miniaturized more.

[0097] When the AC adapter was used, it was made to become the operational mode which does not use the flash lamp 42 and the red-eye lightening lamp 44 in the above example. However, when equipped with the both sides of an AC adapter and the battery 21, in the state of anticipated use (state which does not use the flash lamp 42 and the red-eye lightening lamp 44), only when supplying electric power from an AC adapter and using the flash lamp 42 and the red-eye

lightening lamp 44, it may be made to supply electric power from the battery 21.

[0098] Drawing 12 is a circuit diagram showing the example of composition which enables the mentioned above operation. In this example, since the same numerals are given to the same part as the case where it is shown on drawing 8, that explanation is omitted suitably.

[0099] In this example, the solid state switch 70 is added in parallel to the switch 64. This solid state switch 70 is controlled by CPU 36. Other composition is the same as that of the case in drawing 8.

[0100] In the usual state, CPU 36 changes the solid state switch 70 into the OFF state. The switch 64 is a mechanical switch and when equipped with the AC adapter, it always changes it into the OFF state.

[0101] It is a case where it is equipped with the AC adapter, and when using the flash lamp 42 and the red-eye lightening lamp 44, CPU 36 sends a control signal to the solid state switch 70, and changes it into the state of ON. Next, since the minus side of the battery 21 is connected to the ground side of the electronic camera 1, supply of electric power is started from the battery 21. And after use of the flash lamp 42 or the red-eye lightening lamp 44 is completed, CPU 36 changes into the OFF state of the solid state switch 70, and suspends supply of the electric power from the battery 21.

[0102] By performing such control, even when using the AC adapter, use of the flash lamp 42 or the red-eye lightening lamp 44 can be enabled.

[0103] Since the time when the solid state switch 70 is turned ON is short enough although current will flow from an AC adapter to the battery 21 when it changes the solid state switch 70 into the state of ON when the voltage of the battery 21 is lower than the voltage of an AC adapter, it does not become a big problem.

[0104] In the above example, although it was made not to use the flash lamp 42 and the red-eye lightening lamp 44 according to the junction state of an AC adapter, it cannot be overemphasized that this invention is not what is limited only to this.

[0105] Although the function in which the reverse composition also realizes miniaturization of a battery and reinforcement, and it can be used although the embodiment of this example explained the composition of the battery as a power supply which supplies an AC adapter and big electric power as a power supply which supplies small power is limited, it can supply the device which does not become photography impossible.

[0106] The object for small power and the AC adapter for big electric power are prepared, a judgment of the two adapters is enabled, and it may be made to use properly by a use in a home, so that the AC adapter for big electric power may be used and the AC

adapter for small power which was excellent in portability at the time of a travel may be used.

[0107] [Effect of the invention] Since according to the information processor according to claim 1 the supply state of the electric power from a plurality of power supply sources is judged and either of a plurality of operational modes was chosen according to the decision result, by choosing the operational mode according to the power supply used, and restricting the operation which can be used, a power supply down is not carried out and an information processor does not become use impossible. For example, since the low operational mode of power consumption can be chosen when the AC adapter is used, it becomes possible to miniaturize an AC adapter.

[Brief description of the drawings]

[Drawing 1] is a perspective view showing an example of the composition of the electronic camera which applied the information processor of this invention.

[Drawing 2] is a perspective view at the time of seeing from the side which counters the field X1 of the electronic camera shown on drawing 1.

[Drawing 3] is a perspective view showing the composition inside the electronic camera shown on drawing 1 or drawing 2.

[Drawing 4] is a block diagram showing the electric composition of the electronic camera shown on drawing 1 or drawing 2.

[Drawing 5] is a drawing explaining thinning processing of the pixel in L mode.

[Drawing 6] is a drawing explaining thinning processing of the pixel in S mode.

[Drawing 7] is a display example of the display screen in the case of reproducing the recorded information.

[Drawing 8] is a circuit diagram showing an example of the composition of the power supply section of the electronic camera 1 which shows drawing 1 or drawing 2.

[Drawing 9] is a drawing showing the relation of the state of the power supply discrimination signal acquired from the power supply section and the mounting state of an AC adapter which shows drawing 8.

[Drawing 10] is a flow chart explaining an example of the processing performed by CPU 36 shown on drawing 4.

[Drawing 11] is a drawing showing an example of the alarm display at the time of the AC adapter being used.

[Drawing 12] is a circuit diagram showing other examples of the composition of the power supply section of the electronic camera 1 shown on drawing 1 or drawing 2.

[Description of numerals]

4 Light-emitting part

6 LCD

11 Electric power switch

15 AC adapter jack (a power supply means, the 1st power supply means)

21 Battery (a power supply means, the 2nd power supply means)

36 CPU (a judging means, selecting means)

41 Flash lamp actuator

42 Flash lamp

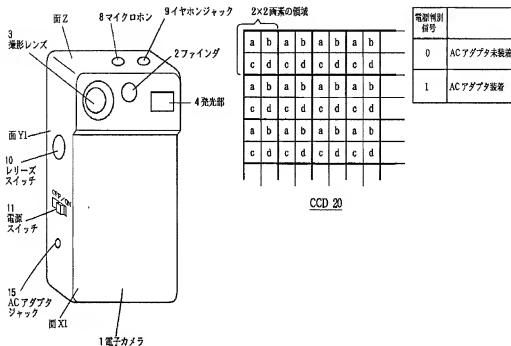
43 Red-eye lightening lamp actuator

44 Red-eye lightening lamp

Drawing 11

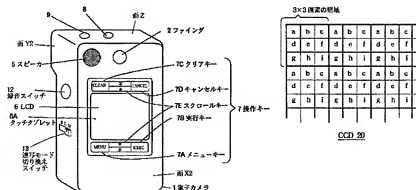


Drawing 1 Drawing 5 Drawing 9



Drawing 2

Drawing 6



Drawing 3



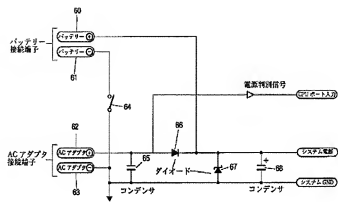
Drawing 7



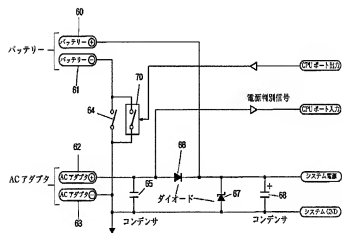
Drawing 4



Drawing 8



Drawing 12



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[Amendment 1]
[Document to be amended] Specification
[Item(s) to be amended] Claim
[Method of amendment] Change
[The contents of amendment]
[Claims]
[Claim 1] An information processor characterized by
including an electric circuit which can receive supply
of electric power from the 1st power supply means to
build in or the 2nd power supply means connected

selectively, a detector circuit which detects a connected state of the mentioned above 2nd power supply means, A supply circuit which supplies electric power from the mentioned above 2nd power supply means to the mentioned above electric circuit while it is detected by the mentioned above detector circuit that the mentioned above 2nd power supply means is connected, an inhibiting means which forbids predetermined operation while it is detected by the mentioned above detector circuit that the mentioned above 2nd power supply means is connected.

[Claim 2] The information processor according to claim 1 characterized by including further a photographing device which captures a photographic subject, an electric circuit of the mentioned above photographing device is included in the mentioned above electric circuit, the mentioned above inhibiting means forbids predetermined operation about photography of the mentioned above electric circuit, while it is detected by the mentioned above detector circuit that the mentioned above 2nd power supply means is connected.

[Claim 3] An information processor characterized by including in an information processor which can perform the 1st operation and 2nd operation with less power consumption than the mentioned above 1st operation, the 1st power supply means that can supply electric power sufficient for the 1st operation, the 2nd

power supply means that can supply electric power with it which has less electric power which can be supplied than the mentioned above 1st power supply means sufficient for the 2nd operation, a switching circuit which sets a supply source of electric power as the mentioned above 1st power supply means in the state where supply of electric power can be selectively received from either the mentioned above 1st power supply means or the mentioned above 2nd power supply means while the mentioned above 1st operation is performed.

[Claim 4] The information processor according to claim 3 characterized by that in the state where supply of electric power can be selectively received from either the mentioned above 1st power supply means or the mentioned above 2nd power supply means, the mentioned above switching circuit sets a supply source of electric power as the mentioned above 2nd power supply means, while the mentioned above 2nd operation is performed.

[Claim 5] An information processor characterized by that an information processor which can receive supply of electric power from the 1st power supply means that has an electric circuit including a photographing device which captures a photographic subject and records a taken image, and in which the mentioned above electric circuit is built or the 2nd removable power supply means connected to

commercial alternating current power selectively, a detector circuit which detects a connected state of the mentioned above 2nd power supply means, a switching circuit which sets a supply source of electric power to the mentioned above electric circuit as the 2nd power supply means while it is detected by the mentioned above detector circuit that the mentioned above 2nd power supply means is connected and predetermined operation is performed [Claim 6] The information processor according to claim 5 characterized by including the mentioned above switching circuit sets a supply source of electric power to the mentioned above electric circuit as the mentioned above 1st power supply means, while it is detected by the mentioned above detector circuit that the mentioned above 2nd power supply means is connected and operations other than the mentioned above predetermined operation are further performed.

[The amendment 2]

[Document to be amended] Specification

[Item to be amended] 0009

[Method of amendment] Change

[The contents of amendment]

[0009]

[Means for solving the problem]

This invention is characterized by the 1st information processor including an electric circuit which can receive supply of electric power from the 1st power

supply means to build in or the 2nd power supply means connected selectively, a detector circuit which detects a connected state of the 2nd power supply means, a supply circuit which supplies electric power from the 2nd power supply means to an electric circuit while it is detected by detector circuit that the 2nd power supply means is connected, an inhibiting means which forbids predetermined operation while it is detected by detector circuit that the 2nd power supply means is connected, a photographing device which captures a photographic subject is established further, and an electric circuit can be made for an electric circuit of a photographing device to be included, and to forbid predetermined operation about photography of an electric circuit to an inhibiting means while it is detected that the 2nd power supply means is connected and detector circuit. In the 1st information processor of this invention, supply of electric power is selectively received from the 1st power supply means to build in or the 2nd power supply means connected, while a connected state of the 2nd power supply means is detected and it is detected that the 2nd power supply means is connected, electric power from the 2nd power supply means is supplied to an electric circuit, and predetermined operation is forbidden while it is detected that the 2nd power supply means is connected. This invention is characterized by the 2nd

information processor including the 1st power supply means that can supply electric power sufficient for the 1st operation, the 2nd power supply means that can supply electric power with it which has less electric power which can be supplied than the 1st power supply means sufficient for the 2nd operation, a switching circuit which sets a supply source of electric power as the 1st power supply means in the state where supply of electric power can be selectively received from either the 1st power supply means or the 2nd power supply means while 1st operation is performed. In the state where supply of electric power can be selectively received from either the 1st power supply means or the 2nd power supply means, the switching circuit can set a supply source of electric power as the 2nd power supply means, while 2nd operation is performed. In the 2nd information processor of this invention, there is less the 1st power supply means or electric power which can be supplied which can supply electric power sufficient for the 1st operation than the 1st power supply means, and in the state where supply of electric power can be selectively received from either of the 2nd power supply means that can supply electric power sufficient for the 2nd operation, while 1st operation is performed, a supply source of electric power is set as the 1st power supply means. This invention is characterized by the 3rd information processor including detector circuit which

detects a connected state of the 2nd power supply means, a switching circuit which sets a supply source of electric power to an electric circuit as the 2nd power supply means while it is detected by detector circuit that the 2nd power supply means is connected and predetermined operation is performed. The switching circuit can set a supply source of electric power to an electric circuit as the 1st power supply means, while it is detected by detector circuit that the 2nd power supply means is connected and operations other than further predetermined operation are performed. In the 3rd information processor of this invention, while a connected state of the 2nd power supply means is detected, it is detected that the 2nd power supply means is connected and predetermined operation is performed, a supply source of electric power to an electric circuit is set as the 2nd power supply means.

[Amendment 3]

[Document to be amended] Specification

[Item to be amended] 0107

[Method of amendment] Change

[The contents of amendment]

[0107]

[Effect of the invention]

According to the 1st - the 3rd this invention, a power supply means can be miniaturized.